

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Appellants: Gartside et al.

Examiner: Nguyen, Cam N.

Serial No.: 09/863,974

Group: Art Unit 1754

Filed: May 23, 2001

Docket: 1094-10

For: PROCESS OF TREATING AN OLEFIN
ISOMERIZATION CATALYST AND
FEEDSTOCK

Dated: October 1, 2003

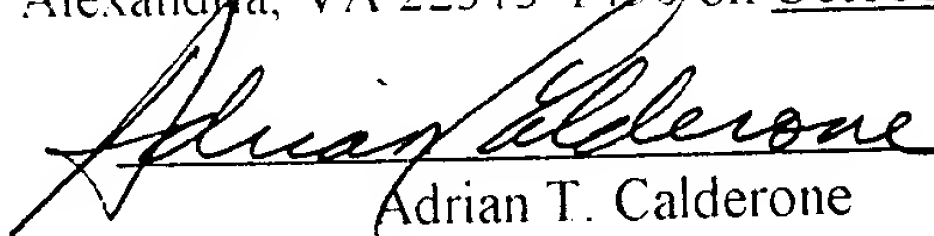
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APPELLANTS' BRIEF

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Adrian T. Calderone

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APPELLANTS' BRIEF

Sir:

This appeal is being taken in view of the final rejection of the claims in the Office Action dated January 2, 2003.

(I) REAL PARTY IN INTEREST

This application is assigned to ABB Lummus Global Inc.

(II) RELATED APPEALS AND INTERFERENCES

There are no known related appeals and/or interferences.

(III) STATUS OF THE CLAIMS

| | |
|--------------------|--------------|
| Claims pending | 1-23 |
| Claims withdrawn | 13-21 |
| Claims rejected | 1-12, 22, 23 |
| Claims allowed | None |
| Claims objected to | None |
| Claims on appeal | 1-12, 22, 23 |

(IV) STATUS OF AMENDMENTS

No amendments to the claims were filed subsequent to the final Office Action of January 2, 2003.

(V) SUMMARY OF THE INVENTION

The invention of the appealed claims relate to a process for activating a basic metal oxide double bond isomerization catalyst. The method comprises contacting the basic metal oxide catalyst under activation conditions with a dry inert gas such as nitrogen containing not more than about 5 ppm molecular oxygen by volume. See Applicant's specification, for example, at page 11 line 3 to page 12 line 11. The activation conditions can include a temperature of at least about 550°C and a period of time of at least about 6 hours. See, Appellants' specification at page 13 line 23 to page 24 line 7. The basic metal oxide can be magnesium oxide, calcium oxide, barium oxide, lithium oxide and combination thereof. Appellants' specification, page 9 lines 18-20. The process can include a decoking step wherein the catalyst is contacted with inert gas containing at least 2% oxygen at a temperature of at least about 460°C for at least about 6 hours. See, Appellants' specification page 13, lines 16-22, and also lines 5-15 for other decoking conditions. The invention also relates to the catalyst itself having substantially no activity affecting amounts of water or carbon dioxide. See, Appellants' specification page 12 line 24 to page 13, line 4. The dry inert gas is preferably pretreated by passage through an oxygen removal system. Appellants' specification page 11 line 23, to page 12 line 11.

(VI) ISSUES

1. Whether claims 10-12 are unpatentable under 35 U.S.C. § 102 (b) or § 103 (a) as being anticipated by, or obvious over, U.S. Patent No. 4,778,943 (hereinafter, "Sun").

2. Whether claims 1-7 and 22-23 are unpatentable as being obvious over Sun taken together with Patent No. 5,953,911 (hereinafter, "Guth").

3. Whether claims 8-9 are unpatentable under 35 U.S.C. § 103 (a) as being obvious over Sun and Guth and further in view of U.S. Patent No. 5,573,988 (hereinafter, "Didillon").

(VII) GROUPING OF CLAIMS

These claims do not stand or fall together but are separately patentable:

Group I - Claims 10-12

Group IIa - Claims 1-7

Group IIb - Claim 22

Group IIc - Claim 23

Group III - Claims 8-9

(VIII) THE CITED REFERENCES

U.S. Patent No. 4,778,943 to Sun

U.S. Patent No. 5,953,911 to Guth

U.S. Patent No. 5,573,988 to Didillon

(IX) THE REJECTIONS

1. Claims 10-12 are rejected under 35 U.S.C. §102(b) as anticipated by, or under 35

U.S.C. §103(a) as obvious over Sun.

2. Claims 1-7 and 22-23 are rejected under 35 U.S.C §103(a) as being unpatentable over Sun taken together with Guth.

3. Claims 8-9 are rejected under 35 U.S.C §103(a) as being unpatentable over Sun taken together with Guth et al, and further in view of Didillon.

(X) ARGUMENT

1. Claims 10-12 (Group I) are not anticipated by or rendered obvious by the Sun patent

Claim 10 is directed to a basic metal oxide catalyst for double bond isomerization treated in accordance with the process of claim 1 and having substantially no activity-affecting amount of water or carbon dioxide.

The examiner states as follows:

Recitation of product-by process limitation in the claims is noted. While the product of the reference is not made by the same process as being claimed, the product made is the same. It has been held that "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even [if] the prior art product was made by a different process." See *In re Thorpe*, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See also *In re Brown*, 173 USPQ 688, 688 (CCPA 1972), *In re Fessman*, 180 USPQ 324, 326 (CCPA 1977), & MPEP 2113.

However, the cases cited by the examiner are apposite only for those situations in which the product in question does not differ from the prior art in composition or properties. For

example, in *In re Thorpe* the U.S. Patent and Trademark Office's position was that Thorpe's assertion of patentability of his product was unsupported by the evidence, and the burden of coming forward with evidence for patentability was on Thorpe "...in view of the 'admission' in his specification that his product has properties 'about equal' to those of prior art..." (*In re Thorpe*, pg. 965). In the present case, Appellants show that the basic metal oxide double bond isomerization catalyst is materially different from the prior art catalyst materials and has different properties with respect to double-bond isomerization.

More particularly, the catalyst of the Sun patent is intended for skeletal isomerization and cannot be used in the claimed process of double bond isomerization. As stated in Sun, column 1, lines 10-16, the invention of Sun relates to skeletal isomerization which is accomplished by contacting unbranched or lightly branched olefins with acidic catalysts at elevated temperatures to form branched olefins having the same number of carbon atoms. Sun mentions nothing about the presence or absence of activity-affecting amounts of water or carbon dioxide. Rather, the Sun catalyst is treated with a halogen source such as halogen acid or ammonium halide. Thus, the Sun catalyst is acidic. However, it is Appellants' goal to eliminate acid sites to prevent fouling reactions which limit the onstream life of the catalyst. See, e.g. Appellants' specification, page 10, lines 17-24. Therefore, the Sun catalyst would not be useful in the process claimed by Appellants. Moreover, with applicant's process alkali metal oxides such as sodium oxide or potassium oxide can be incorporated into the catalyst as promoters (see, specification, page 9, lines 21-22) whereas Sun considers alkali metal oxides to be poisons. (Sun, col. 1, lines 64-66). Thus, even though Sun discloses a catalyst containing alkaline earth

oxide(s) (e.g., MgO, CaO), the Sun catalyst could not be employed in the double bond isomerization process claimed by applicant, and does not meet the requirements of Appellants' claim.

Likewise, as stated at page 688, in the *In re Brown and Saffer* case, the Court agreed with the examiner concerning the product claims because "...the differences between the claimed catalysts and the activated catalysts of the references are either nonexistent or merely obvious ones, and appellants have failed to show otherwise." Also, as stated at page 325 of *In re Fessman*, the appellant "...failed to show that the liquid smoke obtained from his process possessed unobvious differences from the liquid smoke obtained from his process possessed unobvious differences from the liquid smoke compositions shown in the prior art."

In contrast to the situations reported in these cases, Appellants herewith have provided experimental results in Example 1 showing that the process of the present invention, using a purified nitrogen containing no more than 1 ppm of molecular oxygen for a high temperature reactivation step, unexpectedly reduced the subsequent deactivation rate of the magnesium oxide catalyst to less than one third the deactivation rate of the comparison sample using nitrogen from a conventional source containing 10 ppm or more of molecular oxygen. Clearly, claim 10, which recites a double bond isomerization catalyst having substantially no activity-affecting amount of water or carbon dioxide, is directed to a catalyst having a different composition and different properties than prior known catalysts.

Contrary to what is stated in the Office Action, the recitation that the catalyst has "substantially no activity-affecting amount of water or carbon dioxide" is not a recitation of the

intended use but rather of the material composition of the catalyst, which results in substantially improved catalyst properties.

The Office Action cites various authorities in support of the position that the recitation in claim 10 "for double bond isomerization...having substantially no activity-affecting amount of water or carbon dioxide" is merely the recitation of intended use of the catalyst and that the catalyst does not depend on this recitation for completeness. The following comments are directed to the authorities cited.

MPEP 2111.02 states that the preamble of a claim is not given the effect of limitation unless it breathes life and meaning into the claim. However, the preamble does limit the claim if it is essential to point out the invention defined by the claim. The MPEP further states:

Intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article and composition claims, intended use must result in structural differences between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

(emphasis added)

However, in the present case the Sun catalyst is not intended for, and cannot perform, the use intended by Appellants for the reasons stated above. Thus, MPEP 2111.02 does not support the rejection of the claims.

Pursuant to MPEP 2113, if the product in a product-by-process claim is the same as or obvious from a product in the prior art, the claim is unpatentable even though the prior art product was made by a different process. However, Appellants' claimed basic metal oxide

catalyst is not the same or obvious over the prior art, and this is evidenced by the experimental data, as discussed above. This data was improperly ignored.

The situation in *In re Pearson* is distinguishable over the present case. *In re Pearson* concerned, inter alia, claims directed to a previously known composition which could be used for spreading over peanut crops. However, the Court observed that the terms of the claim merely set forth the intended use for, or a property inherent in, an otherwise old composition. *In re Pearson*, 181 USPQ 641, 644 (CCPA 1974). The observation does not apply in the present case. Appellants' claimed composition is neither disclosed nor suggested for the reasons stated above and is materially distinguishable over the catalyst of the Sun patent.

In *In re Thuau* the appellant therein discovered that an old composition was useful for the treatment of diseased tissue. However, the Court determined that he had "...in no way changed the composition for such new use, and as stated the question before us is whether a new and unobvious use for an old composition, without change in or addition to that composition, is patentable." *In re Thuau*, 57 USPQ 324, 325 (CCPA 1943). Therefore, the Court ruled that the composition claims were properly rejected. However, this ruling does not apply to the present case. Sun discloses a different catalyst (one containing acid sites) for a different purpose (skeletal isomerization vs. double bond isomerization). Therefore, Appellants' composition is not disclosed or suggested by the Sun reference for the reasons stated above.

Accordingly, it is respectfully submitted that the rejection of claims 10-12 under 35 U.S.C. §102(b) or 103(a) is not supported.

2. Claims 1-7 and 22-23 (Groups IIa- IIc) are not obvious over Sun and Guth.

a) Sun discloses the regeneration of skeletal isomerization catalysts by heating in an oxygen-containing gas at temperatures ranging from about 200° to about 700°C, and subsequent treating (i.e., activation) of the oxidized catalyst with a halogen source such as halogen acid or ammonium halide. This activation step is completely different and for a different purpose than the activation of the presently claimed catalyst. Sun does not disclose the activation process for a double bond isomerization catalysts of the claimed invention, which uses a dry inert gas containing not more than about 5 ppm molecular oxygen by volume.

The Guth patent is cited for its disclosure relating to regeneration. The Office Action states as follows:

Sun is silent with respect to the limitation on a "dry inert gas containing not more than about 5 ppm molecular oxygen by volume", "no more than about 2 ppm of molecular oxygen", and "no more than about 1 ppm of molecular oxygen" in claims 1 & 23, 2, & 3, respectively. However, it would have been *prima facie obvious* to one of ordinary skill in the art at the time the invention was made to have utilized a regeneration gas, such as nitrogen, having a concentration of from about 50% to about 80% and containing substantially oxygen free with up to 1% oxygen present without significant negative effects, as taught by Guth in order to efficiently activating the basic metal oxide isomerization catalyst of Sun, because Guth fairly suggests that such regeneration gas containing nitrogen and oxygen concentrations provides an excellent carrier for the reductants (see Guth at col. 3, In 6-30). There is a motivation to combine the teaching of the Guth reference with the Sun reference because Guth teaches his catalyst also contains alkaline earth metal compounds (see Guth at col. 4, In 36-37).

Appellants respectfully disagree with this analysis. There is no motivation for

combining the teachings of Guth and Sun. Neither of these patents relate to double bond isomerization.

As stated above, Sun is directed to an olefin skeletal isomerization process, which is distinguished from double bond isomerization as described above, and discloses the use of a magnesium oxide catalyst pretreated with a halogen compound. The Guth patent is directed to the regeneration of a deNO_x catalyst/absorber mixture. The Guth catalyst is an oxidation catalyst of noble or transition metals. Alkali or alkaline earth compounds are used as absorbers of the nitrogen oxides produced by the oxidation catalyst. Although Guth discloses that alkaline earth compounds can be used as absorbers (i.e., hydroxides, carbonates or bicarbonates, Guth col. 4, lines 36-41), Guth does not disclose basic metal oxides, much less the use of basic metal oxides as catalysts. Guth's regeneration is for the purpose of restoring absorption activity not catalytic activity. The technical fields of the Guth and Sun patents are entirely different. Therefore, one skilled in the art would find no suggestion for combining their teachings.

Moreover, the examiner fails to distinguish between regeneration and activation. Regeneration is performed, for example, to remove coke deposits. In applicant's process regeneration is accomplished with an oxygen-containing gas. However, the regeneration process forms water and carbon dioxide, which are catalyst poisons for the double bond isomerization catalyst of the invention. Hence the use of a subsequent activation step using an inert dry gas to restore long term catalyst activity by removing these poisons.

Guth employs a regeneration gas to restore adsorptive capacity of the catalyst for NO_x removal. There is no catalyst "activation" step. Sun discloses the regeneration of skeletal

isomerization catalysts by heating in an oxygen-containing gas at temperatures ranging from about 200°C to about 700°C, and a subsequent heating (i.e., activation) of the oxidized catalyst with a halogen source such as halogen acid or ammonium halide. In contrast with the teachings of Sun, in the present invention the regeneration uses an oxygen-containing gas for the purpose of removing coke. However, the activation step employs an inert gas (e.g., nitrogen) with less than 5 ppm oxygen to remove the combustion products (water and CO₂ in the form of hydroxide and carbonate) from the catalyst to eliminate acid sites. Sun, on the other hand, uses activation to establish acid sites through the use of halide compounds. Thus, the activation of the present invention is completely different from that of the cited prior art, and for a different purpose.

Guth states that in the regeneration gas "...up to one percent oxygen may be present without significant negative effects." In other words, the range of oxygen content in the regeneration gas extends from 0 to 10,000 ppm. This does not constitute a disclosure or suggestion of Appellants' teachings and the recitations of claim 1 herein, which is directed to activation and limits the amount of oxygen to no more than 5 ppm. Neither Guth nor Sun disclose the criticality of this limitation for catalyst activation. And Guth further states that steam is a good carrier in concentrations of 30% to 98% with the balance being nitrogen. Guth, col. 3, lines 26-27. This is contrary to Appellants' recitation of the use of dry inert gas for the activation of the claimed double bond isomerization catalyst, for which steam is a poison. There is no mention in Guth of a subsequent step to remove water or carbon dioxide from the absorber.

One cannot pick and choose from the teachings of a reference only those which would seem to support a rejection and ignore all the inconsistent and contrary teachings. *In re*

Fine, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988). The references must be considered as a whole and suggest the desirability and thus the obviousness of making the combination. *Lindemann Maschinenfabrik GMBH v. American Hoist and Derrick Company et al.*, 221 USPQ 481, 488 (Fed. Cir. 1984). One skilled in the art upon reading Guth and Sun would find nothing to suggest the use of a dry inert gas containing not more than 5 ppm molecular oxygen for the regeneration of a basic metal oxide double bond isomerization catalyst. The combination of the teachings of Guth and Sun would result in a poisoning of the catalyst for the purposes of double bond isomerization.

Moreover, Appellants have provided data which rebut any inference of obviousness. Nothing in the Office Action indicates that the examiner has even considered this rebuttal data. Referring to Example 1 (pages 15-17 of the specification) it can be seen that activating a magnesium oxide catalyst with dry nitrogen which had been passed through an oxygen adsorption guard bed to reduce the oxygen content to 1 ppm produced a catalyst with a deactivation rate less than one-third that of a magnesium oxide catalyst which had been activated with nitrogen from a conventional source which had a higher level of oxygen (10 ppm).

These results are surprising. Nothing in either of the cited references discloses or suggests the advantageous increase in catalyst life by reducing the level of oxygen to below 5 ppm in the activation gas.

Accordingly, it is respectfully submitted that claim 1, and all claims depending therefrom, are allowable over the cited references.

b) With particular reference now to dependent claim 22, indicated above as being

separately patentable in Group IIb, claim 22 more explicitly defines the double bond isomerization catalyst as being for the conversion of internally olefinic compounds to alpha olefinic compounds, and more clearly distinguishes over the Sun and Guth references.

c) With particular reference now to independent claim 23, indicated above as being separately patentable in Group IIc, claim 23 is directed to pretreatment of the dry, inert gas used to activate the basic metal oxide catalyst by passing the inert gas through an oxygen removal system so as to contain no more than about 5 ppm molecular oxygen by volume. Neither Sun nor Guth disclose the pretreatment of the inert gas in an oxygen removal system to reduce the oxygen content to 5 ppm or less. Even if these references were to be combined the present invention would neither be disclosed nor suggested.

3. Claims 8-9 (Group III) are not obvious over Sun, Guth and Didillon.

One skilled in the art would not find any suggestion to combine the teachings of Didillon and Sun. Didillon discloses a single step oxychlorination method which employs regeneration gas containing both a halogen compound and molecular oxygen. (Didillon, col. 2, lines 62-67). The Didillon catalyst is a dehydrogenation and/or dehydrocyclization catalyst comprising a metal element (e.g., platinum) on a refractory oxide (e.g., magnesium oxide) support. Sun, on the other hand, is directed to a skeletal isomerization catalyst. Sun employs a halogen compound but states that the halogen treatment "...should be preformed in a non-oxidizing atmosphere to prevent halide oxidation." (Sun, at col. 2, lines 35-36). Thus, the teaching of Sun explicitly excludes combination with the process disclosed in Didillon.

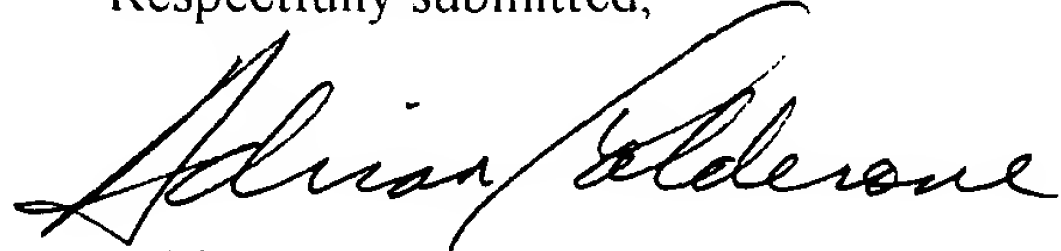
It is respectfully submitted that even if the teachings of Didillon, Sun and Guth were to be combined, Appellants' invention as recited in claims 8 and 9 would not be disclosed or suggested. Claim 8 recites a decoking step which is performed prior to the activation step. Thus, claim 8 encompasses a two-step process of decoking with a dry gas containing at least about 2 percent oxygen, followed by activation with a dry inert gas containing not more than about 5 ppm oxygen. Regeneration by decoking and subsequent activation are two separate steps. As mentioned above, activation after regeneration is necessary because the decoking step is accomplished by the combustion of the coke deposits with an oxygen-containing gas, which produces the catalyst poisons carbon dioxide and water. These poisons are removed by the subsequent activation step. It is an important feature of the present invention that the dry inert gas used for activation of the catalyst contain as little oxygen as possible. Hence, the advantageous use of an oxygen adsorption bed or other means to remove traces of oxygen present in conventional sources of nitrogen as described in the specification at page 12. None of the references disclose or even remotely suggest the two-step decoking-activation process as recited in Appellants' claims.

Moreover, claims 8 and 9 are dependent from claim 1, which is submitted to be allowable for the reasons stated above. Accordingly, claims 8 and 9 are also submitted to be allowable.

C. CONCLUSION

For at least the reasons stated above all of the claims on appeal are submitted to be allowable over the cited prior art. Reversal of the rejections by the BOARD is respectfully requested.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Adrian T. Calderone".

Adrian T. Calderone

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APPENDIX
Claims on Appeal

1. A process for activating a basic metal oxide double bond isomerization catalyst which comprises at least one step of contacting which comprises at least one step of contacting the basic metal oxide catalyst under activation conditions with a dry inert gas containing not more than about 5 ppm molecular oxygen by volume.

2. The process of claim 1 wherein the inert gas contains no more than about 2 ppm of molecular oxygen.

3. The process of claim 1 wherein the inert gas contains no more than about 1 ppm of molecular oxygen.

4. The process of claim 1 wherein the inert gas is nitrogen.

5. The process of claim 1 wherein the activation conditions of the at least one step include a temperature of at least about 550°C and a period of time of at least about 6 hours.

6. The process of claim 1 wherein the basic metal oxide is selected from the group consisting of magnesium oxide, calcium oxide, barium oxide, lithium oxide and combinations thereof.

7. The process of claim 1 wherein the basic metal oxide is magnesium oxide.
8. The process of claim 1 further including the step of decoking the catalyst prior to contacting the catalyst with dry inert gas, wherein decoking the catalyst comprises contacting the catalyst with an inert gas combined with at least about 2 percent by weight molecular oxygen at a temperature of at least about 460°C for at least about 6 hours.
9. The process of claim 8 wherein decoking the catalyst further comprises contacting the catalyst with an inert gas combined with at least about 20 percent molecular oxygen at a temperature of at least about 500°C for at least 18 hours.
10. A basic metal oxide catalyst for double bond isomerization treated in accordance with the process of claim 1 and having substantially no activity-affecting amount of water or carbon dioxide.
11. The basic metal oxide catalyst of claim 10 wherein the basic metal oxide is selected from the group consisting of magnesium oxide, calcium oxide, barium oxide, lithium oxide and combinations thereof.
12. The basic metal oxide catalyst of claim 11 wherein the basic metal oxide is magnesium oxide.

22. The process of claim 1 wherein the double bond isomerization catalyst is for the conversion of internally olefinic compounds to alpha olefinic compounds.

23. A process for activating a basic metal oxide isomerization catalyst which comprises at least one step of contacting the basic metal catalyst under activation conditions with a flowing atmosphere consisting essentially of a dry inert gas which has been passed through an oxygen removal system so as to contain no more than about 5 ppm molecular oxygen by volume.